PROBLEMS RELATING TO THE COLD STORAGE OF BUTTER

by

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INTRODUCTION

Butter is by far the most important dairy product sold in Kansas. Production figures for 1937 (7) show that Kansas ranked twelfth in the United States. Since the butter industry provides such a prominent source of income to the Kansas farmer, the marketing of the finished product to the best advantage is an important problem. The practice of storing butter is important as an aid for orderly and profitable marketing which is beneficial to the producer and the consumer.

Storage butter may be defined as butter which is held for a period longer than thirty days at a sufficiently low temperature to insure its keeping qualities.

Seasonal production and uniformity of consumption are the most important reasons for storing butter. If storage were not practiced, butter due to its perishable nature would have to be sold soon after it was manufactured. The immediate sale would bring about distressingly low prices to the producers when production greatly exceeded consumption. The consumer could well afford butter while at such a low price level but during the period of low production the price might become prohibitive and the consumption of butter decrease. If such a condition pre-

vailed, the development of the butter industry would be seriously retarded. The storage of butter tends to equalize supply and demand so that it acts as a price supporting factor during seasons of flush production and a stabilizing factor during seasons of scant production. These factors have tended to even out the price paid to producers and also make butter available to the consumer at a more uniform and reasonable price.

From the standpoint of the manufacturer the practice of storing butter has been profitable in some instances and unprofitable in others. Much depends upon the operator's judgment and understanding of the problems of storage and the economic factors of production, price, foreign and domestic demand, feed situation, number of cows on farms and other factors. The problems of storage may be grouped under two headings, namely, a. definite and b. indefinite. The definite factors are quality of the butter, costs of storage, facilities for storage and the approximate amount of profit or loss resulting from the purchase of a future contract at the time the butter is placed into storage. The indefinite factors are the price fluctuations of domestic and foreign butter markets, production, consumption, and whether or not a hedge should be used to obtain the maximum profits. All factors should be considered at the

time of storing especially the indefinite ones, since this knowledge on the part of the operator is necessary in guiding him in his forecast of the future markets.

The purpose of this investigation was to study the problems that relate to the storing of butter, and determine to what extent these affect the practice of storing by Kansas creameries.

REVIEW OF LITERATURE

Storage Movement

The movement of butter into and out of storage takes place at quite definite periods. According to Duddy and Revzan (9) most butter moves into storage during the months of May, June, July and August; and the large out-of-storage movement begins in September and extends through February. Their study dealt with storage from the standpoint of profit and loss possibilities from 1922-33 and the establishment of a rating for the various months of the storage season. Their results for the into-storage period show June as the most favorable month in which to store for a profit, with July, May and August ranking in their respective order. In taking butter out of storage, December appeared to be the month of greatest profit, with November, October, September, January and February ranking in their

respective order as to profits. Hunziker (16) states that the into-storage period for the great bulk of butter to be May, June and early part of July, ".....though butter may be and is stored at any time of the year when the supply and prices appear to be favorable for storage". Butter usually moves out of storage within nine months from the time it is placed into storage. Storage movements deviate from normal as a result of various factors affecting production, fluctuating butter prices and quality of the current production. The factors affecting storage movement vary from year to year making it difficult to state definitely when these movements take place.

Factors Affecting the Quantity of Butter Stored

According to Hunziker (16) the factors affecting the quantity of butter stored are a. production, b. prices, c. quality and d. consumer demand as affected by general industrial conditions of the country. The factor of prices includes both domestic and foreign markets as they have much influence on the imports and exports of butter. Duddy and Revzan (9) obtained a negative coefficient of correlation of - .136 between profits and losses and cold storage holdings for the eleven-year period 1922-33. Deviation from a five-year moving average of the cold storage hold-

ings on the four large markets were used as a base in making these calculations. Such a correlation would show that the profit or loss for the previous year has little effect on quantity of butter stored.

Costs of Storage

In a letter to the Vermont Creameries concerning storing of butter, Jones and Mulholland, 1921, (17) stated the Boston Warehouse charges were as follows:

	First Month	Succeeding Months
"Less than 1,000 pounds	37¢ per cwt.	20¢ per cwt.
1,000 - 10,000 pounds	30¢ per cwt.	15¢ per cwt.
10,000 - or more	28¢ per cwt.	13¢ per cwt.

Recent information reported by the Chicago Cold Storage Warehouse Company (3) regarding costs of storage indicate a charge of 13.5 cents per hundredweight per month plus a handling charge the first month of 11.5 cents per hundredweight. Interest charged on loans with warehouse documents as collateral is 5 per cent per annum with an additional charge of one-tenth of one per cent per calendar month being assessed on loans as a service charge. Insurance charges on the average may be figured at 2 cents per hundred dollars value per month. This charge varies with the type of building structure and measures of safety practiced.

RISKS OF STORAGE

Shrinkage

Storage risks with which creameries are concerned are shrinkage, deterioration and price changes. Hammer (13) states that, "Under normal conditions the shrinkage in the weight of butter put in cold storage in tubs or cubes is not very great". Most shrinkage in butter takes place before storage or after being removed from storage.

Deterioration

Since deterioration is one of the most important risks of storage much experimental work has been accomplished on quality with the result that the knowledge of factors related to the keeping quality of butter has increased to a considerable extent. According to Oveyman (26) "One or more of three undesirable defects may develop in butter during storage: a. a tallowy flavor results from oxidation of a portion of the fat. b. Fishiness appears from decomposition of lecithin which occurs naturally in butter; c. Rancidity is produced by decomposition of some of the fat with the liberation of free acids". Hammer (13) points out the defects that develop during the holding of butter are: a. Storage flavor resulting from slow chemical changes

which are reduced to a minimum by using high quality raw material and proper manufacturing methods; b. Rancidity as a result of micro-organisms constituting the important cause of the hydrolysis of the fat setting free the lower fatty acids such as caproic and butyric acid. Lipose may produce this defect in butter made from raw cream but is unimportant in butter made from pasteurized cream because it is destroyed by heat; c. Fishiness is caused by chemical decomposition of lecithin and in some cases thought to be due to some microorganisms; d. Surface taint and cheesiness produced by the action of organisms in the butter, the primary action being on the protein. This defect usually is first noticed on the surface and eventually is evident throughout the mass of the butter (12). Tallowiness is thought to be due to products formed in the butter during the absorption of oxygen by oleic acid. Fishy or cheesy defects eventually become tallowy.

At ordinary temperatures the defects brought about by bacterial action are of importance but under cold storage conditions, the defects are mainly produced by a chemical change expressed through a slow oxidation progressing in some one or more of the non-fatty substances occurring in the buttermilk (8).

Several factors have been studied to determine if they produce the defects during storage. The work of various investigators has definitely shown that high acidity has a deteriorating influence on the keeping quality of butter (11, 23, 26, 28, 36). Grimes (12) found that butter made from sweet cream with 10 per cent starter added had a slightly higher score when taken out of storage than butter made from sweet cream without added culture. According to White (36) butter made from cream containing up to .31 per cent acidity kept better in storage at 0° for eight months than butter made from cream of higher acidity. This same idea was further confirmed by Oveyman (26) who reports that cream ripened to .44 per cent acidity scored higher and held its score longer than at the higher acidities. Hammer and Jensen (15) showed that the acidity of butter cultures had no significant influence on the keeping quality of butter when 10 per cent butter culture was added to pasteurized sweet cream without ripening or when 10 per cent butter culture was added to neutralized and pasteurized sour cream without ripening. Mortensen (23) recommends that unless the creamery has a special demand for sweet cream butter or intends to store for a period longer than two months, it would be more advantageous to produce butter from cream ripened to a low degree of acidity. He concludes that de-

mand is still greater for butter made from ripened cream as it possesses the most of the characteristic butter flavors.

Most experimental evidence supports the belief that salt improves the keeping quality of butter. According to McKay and Larsen (22) salted butter kept much better than unsalted butter. Their results show that sweet butter became cheesy and mouldy. Rahn, Brown, and Smith (27) obtained similar results at 21°F. and also found the increase in acidity was greater for the unsalted butter. Hammer and Hussong (14) reported that a rapid increase in bacterial count occurred in unsalted butter held at 44.6°F. or at 70°F. and that the increase was more rapid at the higher than at the lower temperatures. Olson and Hammer (25) concluded that salted and unsalted butter from both contaminated and clean churns kept better, on the average, at 32°F. than at 45°F. Washburn and Dahlberg (34) found that when butter is stored at -15°F., unsalted butter kept as well as salted butter but when taken from storage and held at 58° to 60°F., the number of the bacteria in the unsalted samples increased whereas they decreased in the salted samples. Grimes (12) found that a decrease occurred in the number of bacteria in salted butter stored at -6°F. for six months. Macy, Coulter, and Combs (19) found that there was a general tendency for moulds, yeasts and bacteria to in-

crease in insalted butter during storage at 35°F. for either one month or nine months and there was a general tendency for these organisms to decrease in the samples of salted butter stored under the same conditions. The higher the salt content, the more marked was the effect on the yeast and bacterial counts. Gray (11) showed that butter containing low percentages of salt, when stored at -10°, 10°, and 32°F., kept better than butter from the same lot containing higher percentages of salt. Butter of a higher salt content appears to keep better when stored at higher temperatures than unsalted or light salted. At lower temperatures the lightly salted butter kept better than unsalted or heavily salted butter. The butter of higher salt content kept better than other butter not so heavily salted at the higher temperatures due to the inhibiting effect of the salt upon the bacteria. Shepard and Olson (31) found a gradual decrease in bacteria count in salted butter and a marked increase in unsalted butter. Oveyman (26) concludes that salted butter scores higher at the beginning of storage but loses score faster than unsalted butter. According to their results the butter that had the highest score before and after storage was made from fresh cream separated from fresh, sweet, whole milk and was not salted. This butter was still of salable quality after two years storage.

Temperature at which butter is held during storage and its effect upon deterioration was studied by Gray (11) and it was concluded that butter held at -10°F. kept best, both when in storage and after removal from storage. McKay (20) concluded after his observation on butter held in storage four and one-half years, that low temperatures should be maintained during the storage holding period. This butter was kept at 0°F. or below and was reported to be of better quality than some fresh butter. Grimes (12) showed that when butter was held at the lower cold storage temperatures 98 to 99 per cent of the bacteria were destroyed. Washburn and Dahlberg (34) found that the bacterial content of butter decreased during storage at -15°F. but increased when the butter was taken out of storage and held at 58° - 60°F.

Gray (11) showed that the type of container used and the degree of fullness for storing butter was a factor affecting keeping quality. Butter in full cans and tubs held at -10° and 10°F. scored about the same. At 32°F. there was a slight difference in flavor of butter in cans. Butter in full cans kept much better than did butter in cans only partially full. Deterioration was perhaps due to the presence of air in the partially filled cans.

According to McKay and Larsen (22) the wash water which contains micro-organisms causes butter to deterior-

ate in quality. Their results show that butter made from pasteurized cream and washed in pasteurized water kept its normal flavor about twice as long as that butter which is washed in unpasteurized water. In some instances unwashed butter from good and well ripened cream kept as well and sometimes better than the butter when washed in unpasteurized water. The factor of wash water as a source of contamination may be overcome by filtering or pasteurizing the water to be used for washing.

According to Oveyman (26) different neutralizers did not affect the initial score or the keeping quality in storage. McKay (20, 21) showed that neutralized butter kept well. Examination of the butter after 4.5 years of storage showed that it had remarkable keeping qualities. He contended that some free acid should be present to insure keeping quality. The butter that does not contain acid will turn rancid. Washburn and Dahlberg (34) and Grimes (12) found no correlation between acidity of the butter and the flavor scores.

The fact that proper pasteurization is important for insuring keeping quality during storage of butter is generally accepted by all workers.

Some investigations have been made on the effect of treated parchment in the prevention of deterioration in

butter. Results brought out by Dahle and Josephson (6) show that butter wrapped in parchment treated with oat flour (Avenex) and held for five to six months was quite effective in preventing staleness of butter stored at 45°F. and only slightly effective at -15°F. At the lower temperatures little deterioration took place in any of the samples. Koenig (18) obtained similar results, reporting the butter wrapped in avenized parchment was better than the control all through the test period. He went further by treating the butter with Avenol, which is a hexane extract of oat flour, and found that after the first four weeks in storage the treated butter was the better butter and most resistant to the development of rancid flavors. The avenized parchment inhibits the development of rancid flavors sufficiently to warrant its use.

Price Changes

Price change is perhaps the greatest risk in the storage of butter. Weld (35) states that "Most people realize in a general way that prices depend on demand and supply". The impossibility of measuring either demand or supply accurately, or of applying any definite formula so as to determine what the price should be under certain conditions, has led some people even to question whether demand and

supply really have anything to do with prices. Duddy and Revzan (9) made a study of profits and losses in the storage of butter so that the results may be a basis for comparing actual profits and losses obtained under the prevailing price and cost conditions. They show that years of large average profit tend to be followed by years of loss or small profit. During years of losses the early into-storage period and early withdrawals from storage kept losses at a minimum or provided the most profit. In years of profit the later into-storage movement and later withdrawal provided the most profit. Years having both profit and loss showed that butter put into storage in May or June shows most profit when withdrawn in September or October.

According to Weld (35) "a hedge may be described in general terms as a purchase or sale for future delivery intended to offset and thereby to protect a transaction in actual merchandise." Tenny (32) regards hedging as a price insurance which is just as available through the Chicago Mercantile Exchange as in fire insurance through a fire insurance company. He states that "price risks is said to have put more people out of business than fire risks".

According to Van Norman (33) "Hedging is done by making a selling contract to deliver at a definite future time a specified commodity at a certain price and place.

Hedging eliminates for the producer the risk of declining markets. The producer gets paid for his product; the speculator takes the risk of price change."

Duddy and Revzan (9) state that "The difficulty of forecasting the fluctuations of the cash market has led many operators to hedge against the possibility of loss on stored butter by making use of the futures market." They made a study on profits and losses occurring in the cash market when hedging was used as a means of controlling the risks of storage operations. The results showed that for the five years 1926, 1929-32, a cash operator who was continuously in the market could expect a profit of $109.00 per car, while the operator who hedged would have incurred a loss of $47.00 per car. This indicates the operator who is storing for profit should hedge in bad years but not in good. The relation of the spread between cash and future prices to the carrying charges for the optional month is a guide to hedging practice. If delivered on the contract, the profit is usually small, but when the hedge is retired by a purchase, the profit is usually larger if the transaction is performed successfully. For straight hedging operations with December the option month, a hedge placed in August and removed in December gave the best results with a July-November combination ranking the second best,

June-October third and May-September least satisfactory. When a November option was used a hedge placed in June and removed in October was the best combination with May-September, July-November and August-November combination ranking in their respective order. From the combination of a speculative and hedging position the results appear quite profitable. The combination system consisted of buying butter each day on the cash market in June and selling future contracts from day to day during July, equivalent to the amount purchased in June if the spread between cash and future price was above the maximum carrying charge. The butter was then sold on the cash market in November and the hedge retired by purchasing future contracts which gave an average profit for the eleven year period 1922-1932 inclusive of $425. per car. If during the eleven year period the butter was bought on the cash market in June and sold in November, an average profit of $351. per car would have been realized.

REQUIREMENTS FOR PROPER STORAGE

Jones and Mulholland (17) advised Vermont creameries to consider the following factors in storage butter:

1. Use cream of highest quality.
2. Pasteurize at 145° for 30 minutes or flash at 176°-180°F.
3. Cool to 48-50°F. and hold for 4-6 hours.
4. Churn at a temperature that will take 45-60 minutes.
5. Steam tubs and liners thoroughly and soak in strong brine.
6. Paraffin tubs or coat the inside with dry salt.
7. Keep a record of each churning showing composition.
8. Hold butter at low temperature till it reaches storage.

Eichel (2) of the Buttermakers Discussion Club, believes that smaller creameries cannot afford to store butter as all patrons want their checks periodically. He thinks it would be impossible for anyone to give advice that would be sure profit due to risks of storage but he insists that butter for storage should be of high quality. Hyzer (2) states that the creamery should be strong financially, and able to stand a loss should the market be unfavorable before undertaking the storage of butter. Groth (1, 2) of the Buttermakers Discussion Club, thinks that storing of butter is risky unless a market is previously established. Uncertain conditions are foreign butter production and price, heavy winter production, speculation and the efforts of some individuals or companies to control the market. He believes that a cooperative should store in order that they may take care of demand during seasons of low production.

Proper pasteurization, clean utensils and the examination of the water periodically to determine its pureness are all accepted among investigators as factors insuring keeping quality of butter (1,2,19).

McKay (21) concluded that butter of highest quality for storage is obtained in the latter part of May and June because a. grass and climatic conditions are at their best, b. lactic acid bacteria predominate, c. per cent volatile fatty acids which give good flavor are at their height. He further recommends that "If good butter is put into storage, good butter will come out of storage."

The work accomplished by previous investigators has been mainly concerned with factors affecting quality. This problem is of great importance in determining the value of the butter when taken from storage but there are many other factors to consider before a manufacturer decides to hold his butter for future sale.

EXPERIMENTAL PROCEDURE

This study was undertaken to obtain more information regarding the problems of storing butter. The information thus obtained should be of assistance to Kansas creamery operators in solving their storage butter problems. Very few studies have been made on storage butter in the past

twenty years during which time storing of butter has gained considerable prominence as a means of controlling supply and demand.

Factors included in this study are: a. the amount of butter stored in relation to production and consumption, b. the into-and out-of-storage movements, c. factors affecting the quantity stored which includes the factors of price, business condition and its effect on consumer demand, production and the previous year's results in regard to profit and loss, d. fixed charges that exist for storage, e. risks of storage such as shrinkage, deterioration and price risks, f. profits from storage with a detailed explanation of hedging, g. the necessary requirements for the storage of butter, h. and a summary of information received from Kansas creameries concerning their practices of storing butter.

For the study of conditions that have existed in the past, data were obtained from Dairy Produce Yearbooks, United States Department of Agriculture Yearbooks, daily price sheets, and other statistical dairy market reports. This information is presented in the form of graphs, charts and tables.

Information in regard to the requirements for proper storage and costs of storage was obtained through personal

contact with Chicago cold storage warehouse business men. Tenny of the Mercantile Exchange in Chicago was also contacted in regard to hedging practices, and what charges and detailed services exist for carrying on a transaction with the exchange.

Information concerning Kansas was obtained by sending a questionnaire (See Appendix) to seventy representative creameries that were located in different parts of the state.

EXPERIMENTAL RESULTS

Amount of Butter in Storage

Figure 1 illustrates that the amount of butter in cold storage seems to be quite seasonal. The largest holdings occur between August and October usually declining thereafter until the seasonal low is reached during April. During the period from April to August the amount of variation between years of cold storage holdings is relatively small. After the period of April to August the variation becomes quite significant. Upon comparison of the years 1932, 1933, 1934 on January 1, there was a variation between the highest and lowest cold storage holdings of 89 million pounds and on September 1, there was a variation of 67 million pounds. The variation in cold storage holdings may

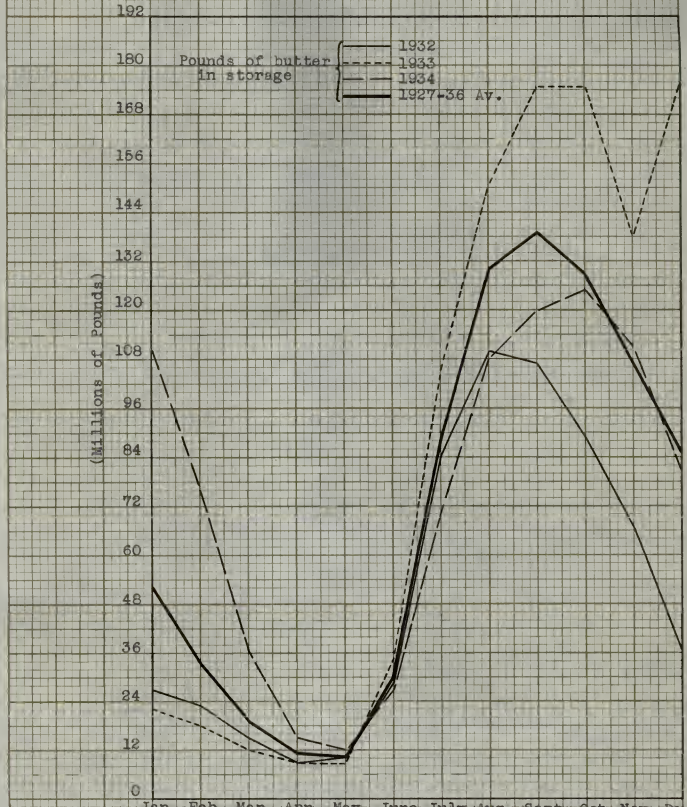

Fig. 1. Cold storage holdings of butter in the United States as shown in Dairy Produce Yearbooks (7).

seem quite large during some periods, however, the trend of storage movements is quite definite. The ten year average 1927-1936 seems to be quite typical of the individual years.

When cold storage holdings of butter on certain dates in per cent of annual creamery butter production is considered, the variation is quite small. Three five year periods 1920-1924, 1925-1929, 1930-1934 and the fifteen year average were studied at quarterly periods on the first of each January, April, July and October (Fig. 2). April appears to be the low period in every case with the amount of cold storage holdings at approximately one-half per cent of annual production. Of the four periods studied, the period of greatest holdings was on October 1 which shows the amount in cold storage to be approximately eight and one-half per cent of annual production. A comparison of the five year periods would tend to show that cold storage holdings in per cent of production in July and October was on the decrease. The rather rapid decline in production of farm butter to the increase in creamery butter production accounts for such a trend occurring.

Figure 3 shows the relationship of cold storage holdings to annual production each year for the quarterly periods 1920-1937 inclusive. October generally appears to

Fig. 2. Cold storage holdings of butter in the United States on certain dates in per cent of annual production as shown in Dairy Produce Yearbooks (7).

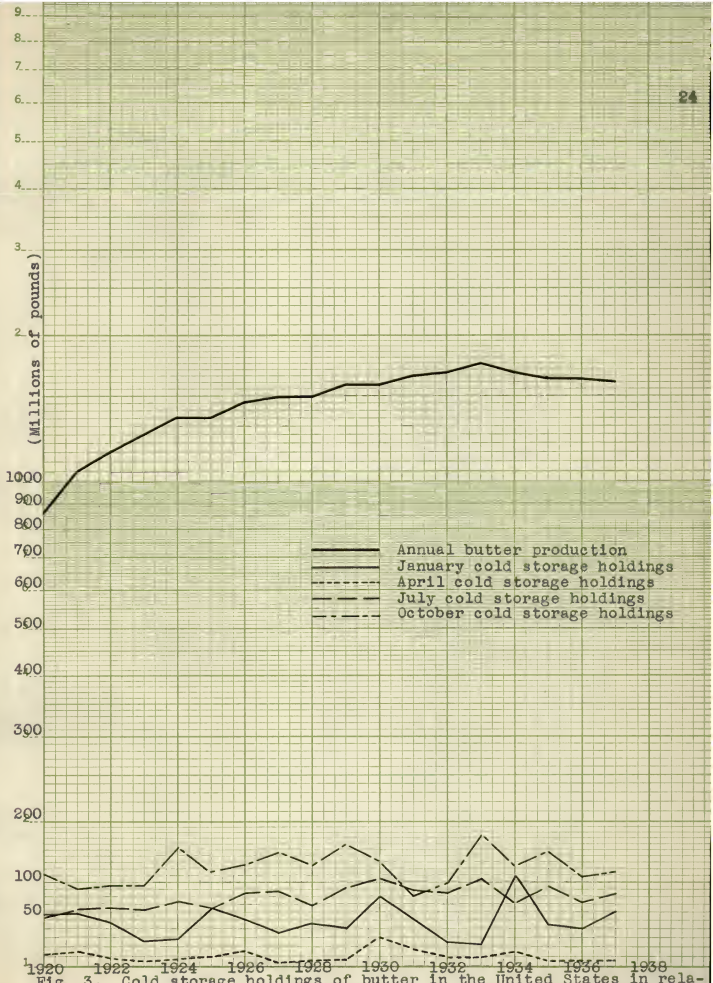

Fig. 3. Cold storage holdings of butter in the United States in relation to annual production as shown in Dairy Produce Yearbooks

be the quarterly period of greatest cold storage holdings with July, January and April quarterly periods ranking in their respective order. In October of 1933 the cold storage holdings of 175 million pounds are the greatest of any years studied for that date. In 1933 butter production was the largest of any of the years studied. Due to large butter production in 1933 and large cold storage holdings in October of that year, the cold storage holdings on January 1 of 1934 exceeded holdings in July 1934 which was the only time during the years studied that January 1 surpassed July 1 cold storage holdings. April 1 was always the quarterly period of lowest holdings.

Cold storage butter in and out movement appears to have quite a definite trend. The out-of-storage movement is at its lowest point when the into-storage movement is the greatest. According to Figure 4, the weeks of the two five-year averages 1926-30, 1931-1935, having the greatest into-storage movement was the 20th to the 30th respectively. The weeks of the greatest out-of-storage movement was for the most part from the 42nd to 52nd and from the 1st to 8th. The into-storage movement in the five-year period 1931-1935 started and attained the maximum earlier than did the 1926-1930 period. The out-of-storage movement shows the same results, that the trend in the more recent period

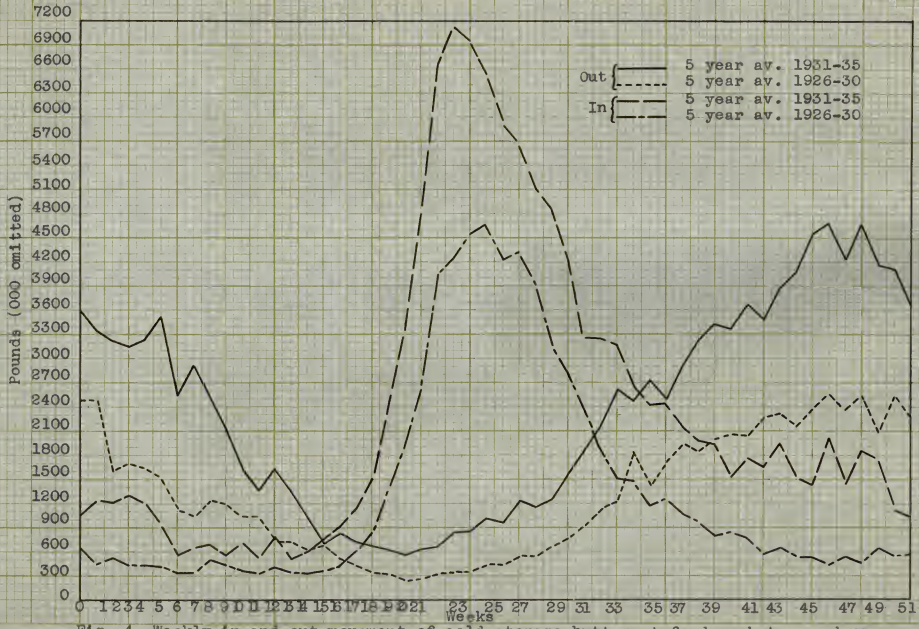

Fig. 4. Weekly in and out movement of cold storage butter at foud markets as shown in Dairy Produce Yearbooks (7).

started about two weeks earlier.

Factors Affecting the Quantity Stored

The variation in the quantity of butter stored is perhaps affected by a combination of factors. Some of the factors which are usually considered to have the greatest effect are price, consumer demand, production and previous year profits. The effect of each factor is measured by plotting that factor against cold storage holdings on September 1 in per cent of a five-year moving average. When considering a number of years of cold storage holdings with a single factor all the cases do not fall on or near the trend line due to some other influencing factor. These cases which do not follow the general trend will be discussed as to the possible cause.

Production as a causative factor appears to be quite important. The trend is quite definite that the greater the production during the May-June-July period the larger are the cold storage holdings, Figure 5. The years 1920, 1922, and 1924 seem to be affected by other factors having more influence than production on the storing of butter. In 1920 the May-June-July production was 92 per cent of the five-year moving average for the same months, yet the storage was greater than in some later years having higher pro-

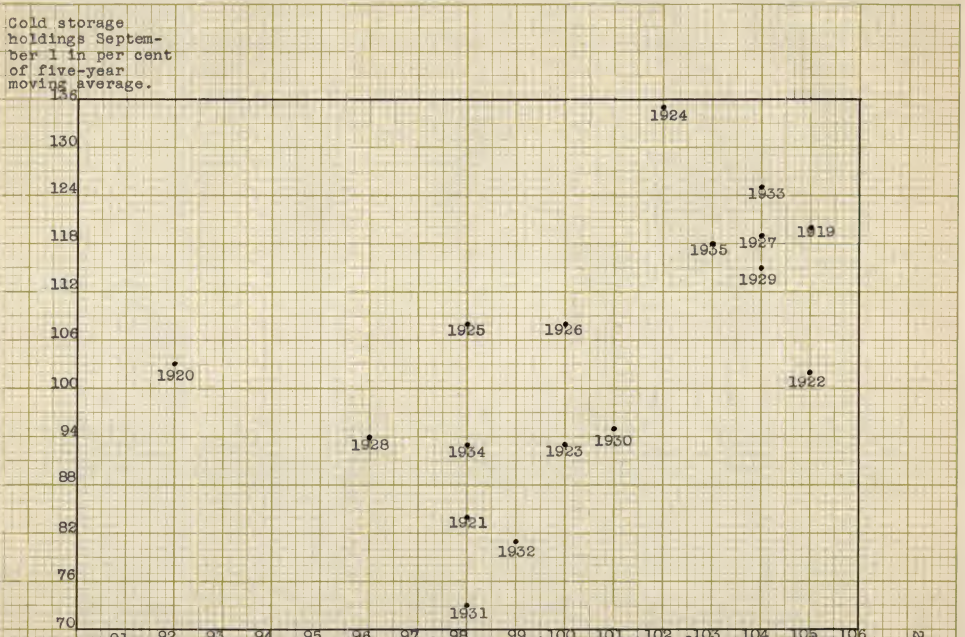

Fig. 5. The effect of butter production on cold storage holdings as shown in Dairy Produce Yearbooks (7).

duction. The factor of previous year profits as determined by per cent change in price from June to November is shown in Figure 8, for 1920 to be 135. Since there was a large profit the year before from storage of butter, it is probable that this was an inducement to put butter in storage. In 1924 the production was 102 per cent of the five-year average and the cold storage holdings higher than for any of the years studied. This was due perhaps to a heavy production, large profits from previous years storage, a farm price index of 143 and a June price which was 83 per cent of the year's average. (Figures 5, 6, 7, 8) In 1922 the production in per cent of the five year average was as high as any year studied but the cold storage holdings were low, thus causing this year to be below the trend line. The factors of previous years' profit and farm price index were similar to 1924 but the June price was 91 per cent of the year's average. A favorable June price was inducement for the immediate sale of the butter.

June price in per cent of the year's average as a factor affecting cold storage holdings does not appear to be one of great importance. It was thought that a low June price would increase the storage holdings for that year but no definite trend is shown in Figure 6. The holdings during certain years may be explained by this factor, but if

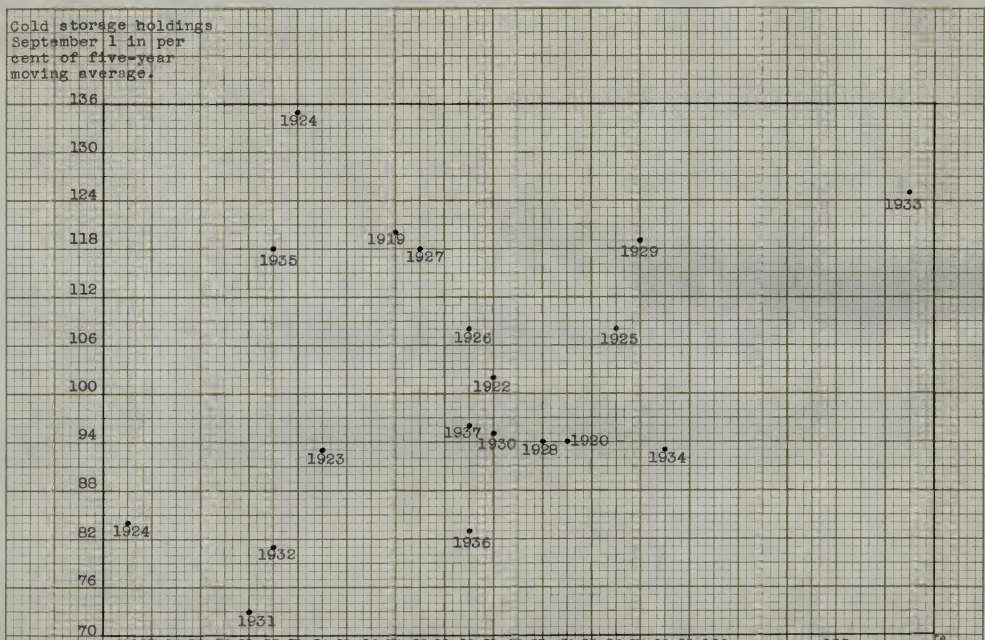

Fig. 6. The effect of June price on cold storage holdings as shown in Dairy Produce Yearbooks (7).

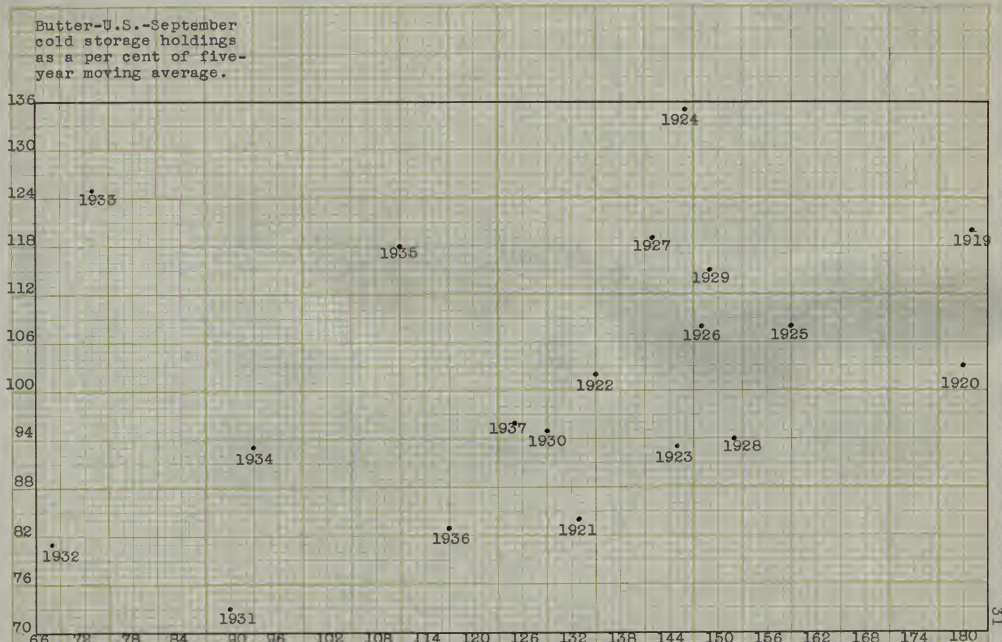

Fig. 7. The effect of index of farm prices on cold storage holdings as shown in Farm Economics (4).

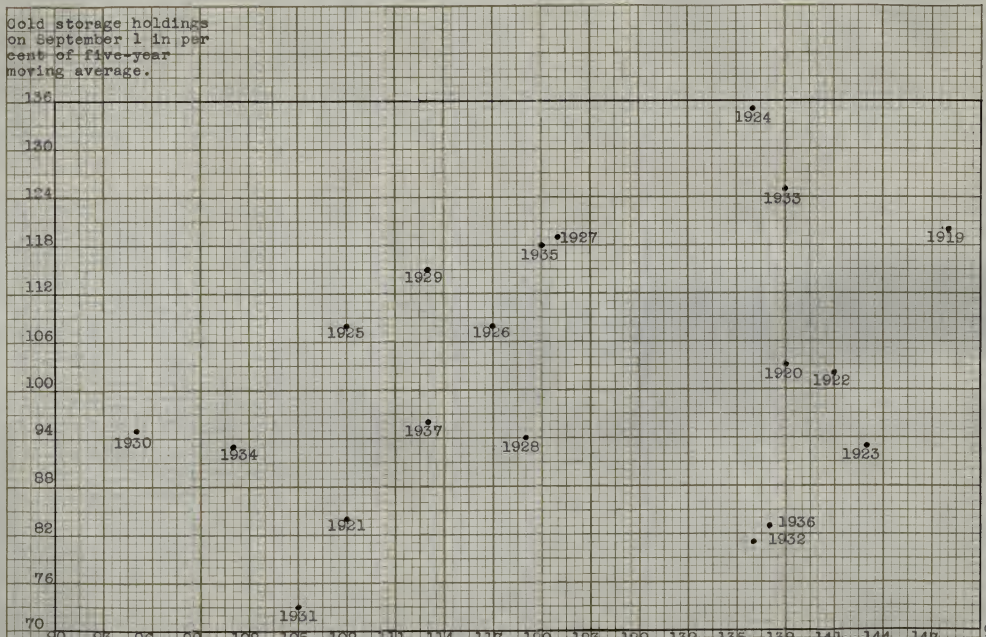

Fig. 8. The effect of price change on cold storage holdings as shown in Dairy Produce Yearbooks (7).

some other factor enters in, the effect of June price is of minor importance. A good example of this would be the year 1933 as is shown in Figure 6, the June price in per cent of year average was 108, yet the cold storage holdings was the greatest of all the years studied. This may be explained in Figure 8 which shows the previous year's profits as determined by the November price in per cent of June to be 135. In the year 1921 the June price was only 76 per cent of the year average and the cold storage holdings were only 83 per cent of the five-year average. The factors of previous years' profits as shown in Figure 8 were not so favorable. A production of 98 per cent of the five-year average, and an index of farm prices, which declined from approximately 177 to 130, were perhaps the reasons for cold storage holdings being so low. The year 1931 showed about the same situation as 1921 except that the index of farm prices was 87. Both 1921 and 1931 were of such a nature that butter storage was not profitable due to the decline of the general price level.

The factor of previous years' profits appears to have an important effect on the quantity of butter stored except for the years 1920, 1922, 1923, 1932 and 1936 when the amount stored fell considerably below the trend line (Figure 8). The amount of butter stored during the years

1920 and 1922 was perhaps influenced by the high June price. In 1920 the June price was 94 per cent of the average for the year and in 1922 the June price was 91 per cent. The fact that a profit was realized in 1922 as the result of a high cash price for June butter, seemed to have an influence on the amount of butter stored in 1923. All factors appeared quite favorable for storage in 1923, but their effect was not noticed until 1924. The cold storage holdings September 1, 1924 expressed in per cent of a five-year moving average were the greatest of all years studied for that date. In 1932 the decline in the general price level as shown by the index of farm prices may have discouraged the storage of large amounts of butter.

General business conditions as measured by an index of farm prices seemed to be a factor in determining the amount of butter placed in storage during certain years. The year 1933 had an index of farm prices of 70 but the cold storage holdings were 125 per cent of the five-year average (Figure 7.) Increased production and large profits the previous year as shown in Figures 5 and 8 respectively were perhaps the factors bringing about the large cold storage holdings in 1933. In the years 1919 and 1920 there was a very favorable index of farm prices but the holdings are not as large as for some of the other years. The effect of a high

June price was perhaps great enough to induce more immediate sales in these two years. June prices were sufficiently high during these years that the advantages of storage were not considered to be so great.

COSTS OF STORAGE

The cost of storing butter in the various warehouses in Chicago have been determined. There are many special warehouse services available such as extra sorting and handling, re-coopering, repacking, weighing and so forth which have separate rates and charges, but these services are not always necessary for storage. The main items to consider are handling, storing, insurance and interest. The following table indicates the costs of storing a carload of butter with the essential items considered.

Table 1. Analysis of Storage Charges for Butter in Chicago

Item of storage	Cost per carload 1st month	Cost per pound 1st month	Cost per carload each month after 1st month	Cost per pound each month after 1st month
Handling	$22.08	$0.00115	----	----
Storage	25.92	0.00135	$25.92	$0.00135
Insurance	00.96	0.00005	0.96	0.00005
Interest	*16.00	0.00104	*16.00	0.00104
(0.1 of 1 per cent value) Service charge	*00.32	0.00002	*0.32	0.00002
Total	$65.28	$0.00361	$43.20	$0.00246

*Based on 80 per cent value.

Note: For the purpose of calculating this table a butter value of $0.25 per pound was used.

The handling charges include receiving into storage and delivery from storage. This charge which is billed with the storage for the first month is made separate from the regular storage cost due to variation in labor costs. If delivery is made to or from the warehouse during other than regular business hours, an extra charge may be made.

Storage costs remain constant for each month. The charges are based on the maximum number of pounds in stor-

age during that month.

Insurance charges on the average may be figured at two cents per hundred dollars of value per month. This charge varies with the construction of the building and measures of safety practiced.

Warehouses frequently extend credit with the stored butter used as collateral. If market conditions are favorable and the quality of the butter satisfactory, a loan may be made up to 80 per cent value of the butter. The interest charge is 5 per cent plus a service charge of one-tenth of 1 per cent.

Considering the items of storage in Table 1, the total cost of storage for the first month would be $0.00361 per pound and each succeeding month would be $0.00246 per pound. From these figures the total storage costs for six months would be $0.01591 per pound. Therefore, if one was intending to store butter for six months, at least one and one-half cents per pound should be allowed for the necessary storage charges.

Hedging charges as protection against market decline while butter is in storage may be considered by those storing butter as a storage cost. The charge for a complete transaction with the exchange is $50.00 per car commission and a government sales tax totaling about $4.00

per car-lot. A complete transaction means the selling of a future contract and then either the purchasing of a contract to retire the one sold or the actual delivering of the butter equivalent to the contract of "sale". This hedging charge would increase the storage cost $0.0028 per pound, bringing the total cost of storage including hedging up to 1.87 cents per pound.

Risks of Storage

Shrinkage in storage butter is a risk of minor importance if efficient workmanship has been performed during the process of churning, and the salt content is not too high. Unsalted or lightly salted butter shrinks the least, and in order to keep shrinkage at a minimum, sufficient working is desirable.

Deterioration of high quality butter during storage is not very noticeable. The low storing temperatures employed in recent years for butter, are effective in preserving the original quality. Butter for storage should be made from high quality cream, using sanitary methods in its manufacture. Care also must be taken that the butter be held at a proper temperature and not contaminated before reaching storage.

Price change is always present as a risk in storing of

butter unless a hedge is used as a means of protection by keeping the loss at a minimum. When butter is stored without the practice of hedging, an increase in the price would mean profit while a decrease in price would result in a loss.

Profits from Storage

The practice of storing butter may be profitable in most years but some years may prove to be very unprofitable. If production, price and business conditions are favorable, the most profit is likely to be obtained by storing the butter without using a hedge as a means of protection against price change. When conditions are not so favorable, some means of protection against price decline should be used. The method used for protection, known as "hedging" simply involves the selling of a future contract equivalent to the amount of butter placed in storage. The cash and future markets do not always fluctuate the same but the relationship is close enough that losses will be kept at a minimum. When the butter is taken from storage it may be delivered to the exchange on the future contract or it may be sold on the cash market and a future contract may then be purchased to offset the one previously sold. The latter method is most commonly used and perhaps more advantageous.

Kansas creameries desiring to place a hedge on stored butter may do so through brokers in Kansas City, Missouri or Lincoln, Nebraska. These offices promptly wire the order to the trading floor of the Chicago Mercantile Exchange of which they are clearing house members. The cost for hedging, as previously mentioned, is $50.00 per car-lot commission charge and $4.00 tax. A minimum margin requirement per car-lot is established for each delivery by the exchange. The broker may request a higher initial margin than that set by the exchange. The minimum margin requirement is usually $300.00 per car-lot. When figuring the cost of hedging, no allowance was made for margin cost.

Due to quite a wide variation in prices for the years 1933, 1934 and 1937, an analysis was made to determine the possible profit and loss when butter was stored with or without the use of hedge. The hedge is placed at the time the butter is stored. When the option month arrives, the butter is either delivered on the contract or a future contract purchased when the butter is sold. Since June is the most common into-storage month and November the most common out-of-storage month for Kansas creameries, the average price during these two months was used.

In 1933 the spread between cash and future price was favorable for storing butter. The production was heavy

during the into-storage period and cold storage holdings were above the five-year average early in the storage season. With these factors taken into consideration, they indicate that a hedge might have been used to an advantage. The cash price for standards in June 1933 averaged 22.3 cents while the November future price in June for storage standards averaged 26¼ cents. If the butter were held until the delivery month of November, it meant a loss on the future contract since November future prices declined to 18 5/8 cents. November cash price had declined to 21.1 cents. This meant a loss on the cash market of 1.2 cents per pound plus the cost of storage which would have been 1.5 cents per pound. On a carload basis this would mean a net loss of $518.40. If the butter had been hedged by the sale of a November future contract in June and this contract purchased in November, it would have resulted in a profit of 7 5/8 cents on the future transaction or $1,464.00 per car-lot. The difference between $1,464.00 (profit from the future contract) and $518.40 (storage costs and loss on the cash market) is equal to a profit of $945.60. The cost of hedging was $54.00 so that a net profit of $891.60 per car-lot would have been obtained by the use of a hedge in this particular year.

In June, 1934 production and cold storage holdings

were below the previous year, the business situation was quite favorable for a general rise in price levels, but the spread between cash and future prices was not great enough to guarantee a profit from hedging. With such conditions prevailing, the most money would probably be made without hedging. If these conditions were considered as being undertain by the creamery storing, then a hedge should be placed which in 1934 would have meant a small loss of approximately one-fifth of a cent per pound. The cash price in June for standards was 24.14 cents and the November future price in June for storage standards was 25.25 cents. In November the cash price was 27.39 cents and the future price was 26 7/8 cents. If no hedge was used then the operator would receive 3¼ cents profit or $624.00 per carload. Storage costs would be $288.00 per carload so that a net profit of $336.00 per carload would be realized. If a hedge was used by selling a November future in June and completing the transaction by purchasing a contract in November, the loss would be 1 5/8 cents. The loss on the hedge, storage costs and cost of hedging would amount to $654.00. Since only $624.00 per carload was realized from the cash sale, the hedging operation would show a net loss for storing butter of $30.00 per carload. If the butter had been delivered on the contract, the loss would have

been $144.00 per carload.

For the year 1937 the possibility of forecasting markets at the time butter was moving into storage was rather difficult. Production and cold storage holdings in June were heavier than for the previous year, business conditions were about the same as in 1936 and the purchases made by the government prevented the market from declining. The cash price for standards in June averaged 29.4 cents and the November standard future price was 31.25 cents. This price spread was great enough to prevent a loss to the creameryman who stored butter. In November the cash price had increased to 35.09 cents which was a gain of 5.69 cents per pound. On a carload basis the profit from the cash market less the cost of storage would have yielded a net profit of $804.48. The future market increased 2¾ cents per pound. This would have meant a loss of $480.00 per carload on the futures. Storage costs of $288.00, hedging costs of $54.00 and losses on future contracts would have brought the total costs to $822.00. Since the profit from the cash market was $1,092.48 the net profit would have been $270.48. This showed a fair profit realized per carload and it also protected the creameryman from a loss, had the market declined.

None of the years analyzed gave results that would

justify delivering the butter on the future contract.

Requirements for Proper Storage

Air, light, heat and humidity are the main factors to be considered in the storage of butter.

Air and light under certain conditions are injurious to the flavor of butter due to oxidation. The oxidizing action of air is intensified in the presence of light. Storage butter should be placed in the largest size package suitable for handling. The most common size package for this country is the 63 pound tub. The tub should be completely filled and covered with parchment paper before the regular tub cover is put in place.

The temperature most commonly used by commercial storage houses was found to be 15°F. This low temperature has been experimentally demonstrated to prevent deterioration of butter. Temperature may be maintained at a constant level during the storage periods by the use of thermostats in the storage room.

The humidity should be kept at a minimum to prevent the growth of mold. This condition is usually not very important to the commercial cold storage houses due to the low temperature at which butter is generally stored and the air contains so little moisture that preservation is in-

sured. In the large commercial cold storage houses, proper ventilation is provided by forced circulation of the cold air. Packages are stacked so that the cold air will have quick access to all the butter.

Facilities Available and Storage Practices among Kansas Creameries

Forty questionnaire forms sent to Kansas creameries were returned giving information regarding storage practices. In answer to the question as to how many made a regular practice of storing butter, 14 reported yes, and 26 reported no. According to the way some of the other questions were answered, more than 14 creameries stored butter but not to the extent that they considered it a regular practice.

Table 2. Number of Years in the Past Ten Years that the Practice of Storing Butter was Deemed Profitable or Unprofitable.

Question stated	Number of years										Number not answered
	1	2	3	4	5	6	7	8	9	10	
Number of years that butter was stored		2	6			2		2		8	20
Number of years profitable:	3	4					4		1	1	27
Number of years unprofitable:	3	2	2	2							31

Eight of the forty creameries stored regularly during the past ten years and twelve creameries stored irregularly throughout the ten-year period. Some of the creameries made a profit each year by storing while none of the creameries report a loss every year.

Table 3. Purpose of Storing Butter and Storage Facilities Available.

Reason	Number of creameries	Storage facilities	Number of creameries	Temperature maintained
Filling of contracts during period of low production	10	Local plant	11	0°F. - +30°F.
Expectation of advance in price	7	Local warehouse	9	0°F.
While a carload is being manufactured	5	Terminal market cold storage plants	6	0°F. - -18°F.
For use in ice cream making	5			
Number not reporting	13	Number not reporting	14	

The main purpose for storing butter by those Kansas creameries reporting was for the filling of contracts during the period of low production. In most cases the creameries which reported that they made a regular practice of storing butter gave the above purpose as their reason. A majority of the creameries stored the butter in their local plant. The creameries that stored butter in their local plants or local warehouse were usually independently owned. The creameries storing butter at terminal market cold storage plants were usually the larger centralizer companies.

Table 4. The Usual Into and Out-of-storage Periods.

Storage movement	Number of creameries active in: Jan-Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	No answer
Into-storage period		8	10	6	3					13
Out-of-storage period					2	4	6	7	6	15

The main into-storage period for Kansas creameries was found to be during May, June and July. The into-storage period was during a shorter period of time than the out-of-storage period. Most of the creameries reporting early out-of-storage movement, such as August and September, used the butter for ice cream making.

Table 5. Factors that Determine the Length of Storage Period.

	Price spread	Butter supply available	Fall and winter production	Quality	Ice cream demand	Consumer demand	Number not reporting
Number of creameries reporting:	10	8	4	3	2	1	12

The creameries which gave their reason for storing butter to be the expectation of advance in price, gave price

spread and fall and winter production as the factors that determined the length of their storage period.

Table 6. Per cent of Volume Stored Annually and Method of Financing.

Year	Per cent of annual production stored: Number of creameries					Methods of financing	Number of creameries
	0-5%	5-10%	Over 10%	Never stated			
1932	6	3			31	Local banks	5
1933	5	4	1		30	Company finance	7
1934	7	1			32	Warehouse receipt	3
1935	6	2	2		30	Personal loan	1
1936	3	5	1		31	No reply	24
1937	3	3	3		31		

Most Kansas creameries store on the average about 5 per cent of their annual production. Those creameries reporting over 10 per cent of their volume stored have a small yearly volume and sell most of their butter locally. In order that they might supply local demand during the period of decreased production, it is necessary that they place most of their surplus in storage.

The centralizer creameries report their method of finance through the company. For independent creameries

their source of finance is one of the other methods. As is noted in Table 6, local banks make it possible in most cases for the smaller creameries to store butter.

Table 7. How Kansas Butter is Marketed and the Most Common Markets.

Amount expressed in per cent	Number of creameries reporting		Name of market	Number of creameries
	Local sales	Terminal markets		
0 to 25	10	3	Chicago	12
25 to 50	5	4	New York	10
50 to 75	3	5	San Francisco	2
75 to 100	2	10	Philadelphia	2
Number not reporting	20	18	Kansas City	1
			Number not reporting	13

Most of the butter produced in Kansas is shipped to a terminal market. Those creameries which report over 25 per cent of their volume being sold locally have a small annual production. Centralizer creameries report very little of their butter to be sold locally.

The markets receiving most of the Kansas butter are Chicago and New York. These markets are perhaps the most

common due to their closeness and the fact that butter is more adapted to the demand that prevails at these two markets.

Those creameries which had deterioration of quality develop during storage, described the off-flavors in storage to be slightly old, fishy and weedy. The decrease in score seemed to range from one-half to one point. Nine of the creameries reporting did not list off-flavors developing. In the most cases slightly old was the description given the flavor defect.

Hedging is not practiced for protection of small marginal profit by many Kansas creameries. In answer to this question, 11 stated no; three stated sometimes; and 26 did not answer. This was answered by those creameries making a regular practice of storing butter.

Several creameries expressed their opinion in regard to the practice of storing butter. Some cooperative creameries report that such a practice is not practical for their organization due to a limited amount of capital available. Other creameries report that by shipping their butter each week, they gain as many times as they lose.

Much interest was expressed by the creameries reporting information concerning this study. Several creameries reported that they had often considered storing butter but

desired more information before attempting such a practice.

SUMMARY AND CONCLUSIONS

1. Amount of butter in cold storage appears to be quite seasonal. Largest cold storage holdings occur between August and October, usually declining thereafter until the seasonal low in reached during April.

2. The period of largest holdings shows the amount of butter in cold storage to be approximately eight and one-half per cent of annual production. For the period of lowest holdings, the butter in cold storage is approximately one-half of one per cent of annual production.

3. The general into-storage movement is May, June and the first half of July. Most out-of-storage movement during November, December, January and February. Most Kansas creameries store butter during the month of June, with May, July and August ranked in order of importance. Kansas creameries report the out-of-storage movement to be largest in November. Next in order was December and October with an equal amount removed each month.

4. Cost of storing butter for six months in a Chicago warehouse is 1.58 cents per pound. This cost includes handling, 0.11 cents; storage 0.81 cents; insurance, 0.03 cents; interest, 0.62 cents; and a service charge of 0.01

cents. If a hedge is used as a means of protection against price decline during storage, the entire storage cost would be 1.87 cents per pound. In very few instances did Kansas creameries hedge.

5. Factors affecting the quantity stored ranked in order of importance are price, consumer demand, production and previous years' profits.

6. Due to low temperatures used by cold storage warehouses, the shrinkage and deterioration of high quality butter during storage is not very noticeable. Price change is probably the greatest storage risk.

7. Most profit may be made from the storage of butter without hedging if the factors of production, consumption, foreign and domestic prices and other factors are favorable for price advances. For years when these conditions are unfavorable to price advance, it is advisable to hedge to keep losses at a minimum.

8. Forty per cent of 20 Kansas creameries reported the storage of butter every year during the past 10 years. The main reason for storage is to supply their demand during the season of low production. The length of their storage period was determined in most cases by price change and supply available.

9. Most Kansas creameries store their butter at the

local plant or warehouse at zero degree Fahrenheit. Only six out of twenty-six creameries reporting, state that they store at the terminal market.

10. Those creameries reporting stated that approximately 75 per cent of the Kansas butter is shipped to Chicago and New York markets with the remaining 25 per cent being sold locally.

11. In most cases Kansas creameries were financed for storage operations by their company and by local banks.

12. Those creameries reporting deterioration of quality developing during storage described the off-flavor to be storage, slightly old, fishy and weedy. The decrease in score was reported to range from one-half to one point.

13. Storing of butter does not appear to be very extensively practiced by Kansas creameries, however, each creamery reporting seemed interested in the results of the study.

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The author also expresses his appreciation to the many Kansas creameries that furnished information concerning practices in Kansas.

APPENDIX

QUESTIONS IN REGARD TO "STORAGE BUTTER PROBLEMS."

1. Do you make a regular practice of storing butter?
   Yes ( ) No ( )

2. How many times during the last ten years have you stored butter? Number of times ( )

3. For what purpose do you store butter?

	Check which
a. Local demand or filling of contracts during period of low production.	( )
b. Expectation of advance in price.	( )
c. During the time a carload of butter is being manufactured.	( )
d. For using in ice cream making etc.	( )

4. What is the usual period of storage?

   a. Periods (dates) into storage. Month _____

   b. Period (date) out of storage. Month _____

5. What factors determine your length of storage period?

   a. _____.
   b. _____.
   c. _____.
   d. _____.

6. What storage facilities do you have available?

   a. Local plant ( ) What temperature is maintained__

   b. Local warehouse ( ) What temperature is maintained__

   c. Terminal market ( )

7. Quantity stored (% volume stored annually.)

1932 _____ 1933 _____ 1934 _____ 1935 _____

1936 _____ 1937 _____

8. How is your butter marketed?

% local ____ % shipped ____ List markets

_____

_____

_____.

9. Has the practice of storing been profitable?

a. Number of years in past 10 years that it was profitable _____

b. Number of years in past 10 years that it was unprofitable _____

10. Has deterioration of quality developed during storage? _____

a. What off-flavors have developed?_____

b. What would you say was the amount of change in score? _____

11. Do you make a practice of hedging for protection of small marginal profit? _____

12. How is your stored butter financed?

Local banks _____ Warehouse receipt _____

Company finance ____ Private loans _____

13. Would you be interested in receiving a report of Kansas creameries regarding this subject? Yes ( ) No ( )

NOTE: The identity of your creamery will not be disclosed in any tabulations.

SPECIAL COMMENTS

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married, as soon as the law'd allow. Nancy never opened her head, all through it'"[63].

Nancy's philosophy is expressed in four sentences:

"'Jest so much love, dear...don't you forgit... no matter where 'tis! An' James' could take his love away from me, but the Lord A'mighty himself can't take mine from him. An' so 'tis, the world over. You can al'ays love folks, an' do for 'em, even if your doin's only break your heart an' givin' 'em up...'"[64].

Alice Brown's knowledge of human nature was depicted here. This, with her character types, broadens her reader's sympathies.

Miss Brown's story, The Experience of Hannah Prime, is a study of a New England revival meeting. Hannah Prime is a widow stricken with grief because of her son who had taken the downward path. She finds relief in watching the dust settle on the woods and the lake.

The description of the village schoolroom in which the meeting is held is interesting:

"There were maps of North and South America, the yellowed evergreens, relics of 'Last Day', still festooned the windows and an intricate 'sum' there

---

[63] Brown, Alice, Meadow Grass, p. 265.
[64] Ibid., p. 276.

" explained to the uncomprehending admiration of the village fathers, still adorned the blackboard"[65].

The prayer meeting which Hannah testified is pictured in this description:

"Taking it all in all the meeting had thus far mirrored others of its class. If the droning experiences were devoid of all human passion, it was chiefly because they had to be expressed in the phrase of strict theological usage. There was an unbroken agreement that feelings of this sort should be described in a certain way. They were not the affairs of the heart and market; they were matters pertaining to that awful entity called the soul, and must be dressed in the fine linen which she herself had elected to wear"[66].

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[65] Brown, Alice, Tiverton Tales, p. 204.
[66] Ibid., p. 206.

CONCLUSION

This thesis contains many illustrations to show how New England localities impressed five women short story writers: Harriet Beecher Stowe, Rose Terry Cooke, Sarah Orne Jewett, Mary Wilkins Freeman, and Alice Brown and how these authors utilized their material. This has been a task of impressionistic criticism from a set point of view: the importance of the New England locality as a contributing factor to these authors and their work.

The method of treatment was to read a majority of the short stories dealing with New England, written by these women and to ascertain just how the locality affected their work.

For the short story locality, therefore contributes the typical setting. It gives to the short story the touch of intimacy and reality. It differentiates the story at once from the mass of the other short stories, and makes it characteristic and significant. Take New England away from Mrs. Stowe's, Mrs. Cooke's, Miss Hewett's, Mrs. Freeman's and Miss Brown's stories and they are robbed of their charm.

New England has a gallery of its own characters. These readily become the principals in a short story because their individual mannerisms suggest plots. A type like Adoniram Penn in The Revolt of Mother by Mrs. Freeman, presents a problem of forcing a close-fisted, habit-stunted man into an act of plain duty.

Another example is found in Nancy Boyd in Nancy Boyd's Last Sermon when Nancy knows that her neighbors are gossiping about her aid to her divorced husband; yet she makes it possible for him and his second wife to get along financially; she nurses him while he is ill and even has a mother's love for him now that she is no longer his wife.

Through characters that are distinctive, plots are suggested and situations evolved. But in addition to this source, the locality itself, irrespective of its character, furnishes interesting and dramatic situations. Thus the stillness and the loneliness of the country to Amanda, the city mouse, drive her purposely to shorten her visit. The locality, therefore, in Rose Terry Cooke's A Town Mouse and a Country Mouse created the situation.

The main thought of Farmer Eli in Farmer Eli's Vacation is that he is happy only in the life he knows and in the place where he has always lived. The sea does not seem natural to him and he refuses to spend more than one night at the sea shore.

Martha Dean in Sarah Orne Jewett's Mary and Martha, often fretted because she was dissatisfied with their life together on a hilltop just outside the village. She wished that she were in the village and was sure that they would get more work "if they were right among folks"[67].

Almost every New England story develops through the peculiar nature of the farmers' existence in Massachusetts and Vermont. Mrs. Freeman, especially, has used this theme.

New England makes its own distinctive appeal to the people; they act according to the prescribed convention of their society. But even the austere Puritanism in New England can undergo a change. For example, courage, in The Revolt of Mother, necessitated the defiance of a husband's orders and of the gossip of the neighborhood.

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[67] Jewett, Sarah Orne, A White Heron, p. 183.

We say, therefore, that locality contributes typical settings, typical local characters, typical situations, and typical problems of conscience to the short story. These, according to the nature of the material,help to produce stories in which the tragedy, the pathos, the humor, and the comedy are typical.

The tragedy of Lucindy in After All by Alice Brown is that as long as the old judge lives she is restrained by his Puritanistic views. When the old judge died, instead of the customary mourning and the routine of the household duties as her father had wished, she immediately changed the order of affairs and did all that she had wanted to do for forty years of her life.

Louisa, the old maid in A New England Nun by Mary Wilkins Freeman, gains clearness and truth seemingness, reality, or verisimilitude, by being depicted as a New England woman, though her views are narrow throughout the story.

Humor is shown in After All when Lucindy comes to the Wilson's to borrow the saddle so she may go horseback riding.

> "'You know I always possessed to ride horseback, she said, addressing herself to Lothrop, 'and my father would never let me. And now he ain't here, I mean to try it and see if 'tain't full as nice as I thought'....'Lucindy! ain't you goin' to pay no respect to your father's memory'?"[68].

Lothrop was not amused, nor was he shocked as was his wife. He was aware of the tragedy of Lucindy's repressed and lonely life.

Much of the work of these New England short story writers, somber as it is, really in thought presents humorous individual characters. Examples are Deacon Pitts in The Experience of Hannah Prime, by Alice Brown; Candace, in A Village Singer, by Mary Wilkins Freeman; and Calib, in A Church Mouse, by Mary Wilkins Freeman.

The early American periodicals were forced to use native material. American writers did not excel in the novel. Furtherto limit the field of material was the fact that the American public did not desire essays. The short story, therefore, sprang up because there was a need for it and the rapid growth in United States territory and in its population created a larger demand for reading matter. The

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[68]Brown, Alice, Meadow Grass, p. 32.

supply of periodicals continued to increase, and as these magazines had to be filled with interesting material to keep their increasing circulation, the short story was drafted in to fill the gaps. The American writers had no competition from England, as English short story writers were inclined to be verbose, clumsy, and superficial.

Thus the short story became of necessity a form of fiction in America. Early eighteenth century so called gift books lay about on people's desks with crude attempts at short stories therein. Poe made a standard for all future American short story writers by the use of unity of impression and of suspense.

Poe, Irving, Hawthorne, and Bret Harte were the forerunners of the production of the short story of a typical American setting and character. Harriet Beecher Stowe, Rose Terry Cooke, Sarah Orne Jewett, Mary Wilkins Freeman, and Alice Brown wrote that story. These five women have shown types or distinctive characters, the typical old maid, the farm drudge, the austere Puritan, the domineering husband, and the meek wife. They have without exception certain like peculiarities of dialect which were pointed

out in detail on page four. The New England customs are depicted in social usages and in the New England hospitality and neighborliness. The individuals in New England seem to have inherited certain distinctive ideals or traditions. These in turn are transmitted to their children. The descriptions are accurately given with many examples of natural backgrounds. Local color has been responsible for America's most characteristic short stories.

A LIST OF THE SHORT STORIES STUDIED

Harriet Beecher Stowe[69]

Poganuc People

1. Dissolving Views
2. Dolly
3. The Illumination
4. Dolly's Adventure
5. Village Politicians
6. Dolly's First Christmas Day
7. The Doctor's Sermon
8. Election Day at Poganuc
9. Dolly's Perplexities
10. Dolly and Nabby Are Invited Out
11. Dolly Goes Into Company
12. Colonel Davenport's Experiences
13. The Puzzle of the Poganuc
14. The Poganuc Puzzle Solved
15. Poganuc Parsonage
16. Spring and Summer Come at Last
17. Summer Days in Poganuc
18. Going "A-Chestnutting"
19. Dolly's Second Christmas
20. The Apple Bee

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69 Harriet Beecher Stowe is the author of 218 short stories.

21. Seeking a Divine Impulse

22. "In Such an Hour as Ye Think Not"

23. Dolly Becomes Illustrious

24. The Victory

25. The Funeral

26. Dolly at the Wicket Gate

27. The Crisis

28. The Joy of Harvest

29. Six Years Later

30. The Doctor Makes a Discovery

31. Hiel and Mabby

32. Miss Derby Arrives

33. Preparations for Seeking Life

34. Last Words

Pink and White Tyranny

35. Falling in Love

36. What She Thinks of It

37. The Sister

38. Preparation for Marriage

39. Wedding, and Wedding Trip

40. Honey-Moon and After

41. Will She Like It

42. Spindlewood
43. A Crisis
44. Changes
45. Newport
46. Home A'La Pampadour
47. John's Birthday
48. A Great Deal of Moral Conflict
49. The Follinsbees Arrive
50. Mrs. John's Party, and What Came of It
51. After the Battle
52. A Brick Turns Up
53. The Castle of Indolence
54. The Van Astrachans
55. The Spider-Web Broken
56. Common-Sense Arguments
57. Sentiment vs. Sensibility
58. Wedding Bells
59. Checkmate
60. After the Storm

Oldtown Folks

61. How We Kept Thanksgiving at Oldtown
62. Miss Asphyxia Smith
63. Miss Mehitabel Rossiter

Atlantic Monthly

64. The Mourning Veil Vol. 1 page 63

65. New England Ministers Vol. 1 page 485

66. Our Second Girl Vol. 21 page 50

67. Little Captain Trott Vol. 23 page 300

68. The Ghost in the Mill Vol. 25 page 688

69. The Widow's Bandbox Vol. 26 page 62

70. Mis' Elderkin's Pitcher Vol. 26 page 157

71. Colonel Eph's Shoebuckles Vol. 26 page 424

72. Captain Kidd's Money Vol. 26 page 522

73. The Ghost in the Cap'n Brown House Vol. 26 page 654

74. The Parson's Race Horse Vol. 42 page 470

75. A Student's Sea Story Vol. 43 page 100

Rose Terry Cooke[70]

Atlantic Monthly

1. Sally Parson's Duty Vol. 1 page 24
2. Turkey Tracks Vol. 1 page 149
3. Maya, the Princess Vol. 1 page 263
4. Eben Jackson Vol. 1 page 525
5. Roger Pierce Vol. 1 page 776
6. Metempsychosis Vol. 2 page 59
7. Three of Us Vol. 2 page 139
8. Ann Potter's Lesson Vol. 2 page 419
9. Did I? Vol. 3 page 213
10. Lizzie Griswold's Thanksgiving Vol. 3 page 284
11. The Ring Fetter Vol. 4 page 154
12. The Memorial of A.B. Vol. 5 page 186
13. Gone Vol. 6 page 571
14. The Sphinx's Children Vol. 5 page 746
15. Miss Lucinda Vol. 8 page 141
16. Out of the Body to God Vol. 9 page 721
17. A Woman Vol. 10 page 694
18. The New Sangreal Vol. 12 page 343
19. Dely's Cow Vol. 15 page 665
20. Oriole Vol. 30 page 545

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70 Rose Terry Cooke wrote 93 short stories.

21. Best Vol. 31 page 321

22. Arachne Vol. 47 page 334

23. Penna's Daughter Vol. 35 page 270

24. "The Thing Which Hath Shall Be" Vol. 35 page 408

25. The Antietam Statue Vol. 37 page 547

26. Freedom Wheeler's Controversy with Providence Vol. 40 page 65

27. The Dream Fay Vol. 42 page 38

28. Clary's Trial Vol. 45 page 465

29. The Saffron Fly Vol. 46 page 16

30. All Saint's Eve Vol. 46 page 169

31. Concerning Dead Love Vol. 47 page 477

32. Some Account of Thomas Tucker Vol. 50 page 177

33. A Town Mouse and a Country Mouse Vol. 67 page 792

34. Too Too Late Vol. 19 page 32

35. Miss Beulah's Bonnet Vol. 60 page 579

Harper's Magazine

36. About Dolly Vol. 54 page 557

37. Aceldamar Sparks Vol. 19 page 190

38. Will's Will, and his two Thanksgivings Vol. 60 p. 112

39. The Widow Case Vol. 50 page 732

40. Two Vol. 62 page 928

41. Sub Rosa Vol. 46 page 375

42. Squire Paine's Conversation Vol. 56 page 608
43. Segavia and Madrid Vol. 56 page 731
44. Rachel's Refusal Vol. 15 page 797
45. Poor Mary Ann Vol. 52 page 394
46. A Picture Vol. 20 page 325
47. Odd Miss Todd Vol. 65 page 701
48. Number Two Vol. 47 page 571
49. Mytown Vol. 55 page 641
50. My Visitation Vol. 17 page 232
51. Alex Thuriot Thorne Vol. 15 page 355
52. Amandar Vol. 61 page 581
53. Asleep Vol. 62 page 338
54. Cal Culner and the Devil Vol. 57 page 547
55. Dorn Roescher, the Myth Vol. 55 page 94
56. Before Breakfast Vol. 21 page 329
57. Mrs. Flint's Married Experience Vol. 62 page 79
58. The Assassin of Society Vol. 14 page 760
59. Down the River Vol. 21 page 793
60. For my two Valentines Vol. 46 page 452
61. Grit Vol. 54 page 452
62. Haunted Vol. 47 page 832
63. Mrs. Anthon's Christmas Present Vol. 20 page 186

64. Miss Muffet and the Spider Vol. 20 page 764

65. Miserable Man That I Am Vol. 21 page 107

66. Matchmaking Vol. 19 page 778

67. Martha Wyatt's Life Vol. 12 page 763

68. Macarius's Lesson Vol. 49 page 127

69. Knoware Vol. 58 page 37

70. The Lamentable Complaint of Maria Ponrelle, Spinster Vol. 18 page 721

71. Lost Vol. 18 page 674

72. Lost on a Railway Vol. 22 page 661

73. Lost on the Prairie Vol. 20 page 467

74. Saint Symphorien Vol. 19 page 195 Scribner's Monthly

75. Pane Pictures Vol. 13 page 202

76. Divorced Vol. 5 page 160

Sarah Orne Jewett[71]

Deephaven

1. Kate Lancaster's Plan
2. The Brandon House and the Lighthouse
3. My Lady Brandon
4. Deephaven Society
5. The Captains
6. Danny
7. Captain Sands
8. The Circus at Denby
9. Gunner-Fishing
10. Mrs. Bonny
11. In Shadow
12. Miss Chauncey
13. Last Days at Deephaven
14. The Guests of Mrs. Timms

The Life of Nancy

15. The Life of Nancy
16. A White Heron
17. The Gray Man

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[71] Sarah Orne Jewett has written 162 short stories.

18. Farmer Finch
19. Marsh Rosemary
20. The Durham Ladies
21. A Business Man
22. Mary and Martha
23. The News from Petersham
24. The Two Browns
25. Fame's Little Day
26. Sister Peacham's Turn
27. An Only Son

Tales from New England

28. Low Lane
29. A Lost Lover

Atlantic Monthly

30. Mr. Bruce
31. The Shore House
32. Together
33. Deephaven Cronies
34. Deephaven Excursions
35. A Bit of Shore Life
36. Flowers in the Dark
37. Andrew's Fortune
38. River Driftwood
39. From a Mournful Villager
40. Tome's Husband

41. A New Parishoner
42. A Landless Farmer
43. The Hare and the Tortoise
44. An Only Son
45. The Courting of Sister Winby
46. A Caged Bird
47. The Landscape Chamber
48. Miss Tommy's Watchers
49. The Mistress of Sydenham Plantation
50. A Winter Courtship
51. Going to Shrewsbury
52. The White Road House
53. The Quest of Mr. Toaby
54. The Town Poor
55. By the Morning Boat
56. The Native of Winby
57. The Only Rose
58. Martha's Lady
59. The Queen's Twin
60. The Dunnet Shepherdess
61. The Foreigner

The Best Stories of Sarah Orne Jewett

62. Mrs. Todd
63. The Schoolhouse
64. Captain Littlepage
65. At the Schoolhouse Window
66. The Waiting Place
67. The Outer Island
68. Green Island
69. William
70. Where Pennyroyal Grew
71. The Old Singers
72. A Strange Sail
73. Poor Joanna
74. The Hermitage
75. On Shell-Heap Island
76. The Great Expedition
77. A Country Road
78. The Bowden Reunion
79. The Feast's End
80. Along Shore
81. The Backward View
82. The Hilton Holiday
83. Aunt Cynthia Dallet
84. The Flight of Betsy Lane

Mary Eleanor Wilkins Freeman[72]

Edgewater People

1. The Voice of the Clock
2. The Flowering Bush

A New England Nun

3. A New England Nun
4. A Village Singer
5. A Gala Dress
6. The Twelfth Guest
7. Sister Lily
8. Calla-Lilies and Hannah
9. A Wayfaring Couple
10. A Poetess
11. Christmas Jenny
12. A Pot of Gold
13. The Scent of Roses
14. A Solitary
15. A Gentle Ghost
16. A Discovered Pearl
17. A Village Lear

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[72] Mary Eleanor Wilkins Freeman wrote 173 short stories and 75 others not republished from magazines. Of these, 71 are published in Harper's Magazine.

18. Amanda and Love

19. Up Primrose Hill

20. A Stolen Christmas

21. Life Everlastin'

22. An Innocent Gamester

23. Louisa

24. A Church Mouse

25. A Kitchen Colonel

26. The Revolt of Mother

27. Emmy

Harper's Magazine

28. A Poetess

29. A New England Prophet

Everybody's Magazine

30. The Givers

31. The Last Gift

32. Lucy

33. The Butterfly

34. Eglantina

35. The Chance of Araminta

36. The Vacant Lot

The Love of Parson Lord

37. The Love of Parson Lord

38. The Tree of Knowledge

39. Catherine Carr

40. The Three Old Sisters and the Old Beau

41. One Good Time

42. The Shadows on the Wall

A Humble Romance

43. A Humble Romance

44. Two Old Lovers

45. A Symphony in Lavender

46. A Tardy Thanksgiving

47. A Modern Dragon

48. An Honest Soul

49. A Taste of Honey

50. Brakes and White Vi'lets

51. Robins and Hammers

52. On the Walpole Road

53. Old Lady Pingree

54. Cinnamon Roses

55. The Bar Light-house

56. A Lover of Flowers

57. A Far-away Melody

58. A Moral Exigency

59. A Mistaken Charity

60. Gentian
61. An Object of Love
62. A Gatherer of Simples
63. An Independent Thinker
64. In Butterfly Time
65. An Unwilling Guest
66. A Souvenir
67. An Old Arithmetican
68. A Conflict Ended
69. A Patient Waiter
70. A Conquest of Humanity

Alice Brown[73]

Meadow Grass

1. Number Five
2. Farmer Eli's Vacation
3. After All
4. Told in the Poorhouse
5. Herman's Ma
6. Heartsease
7. Mis' Wadleigh's Guest
8. A Righteous Bargin
9. Joint Owners in Spain
10. At Sudleigh Fair
11. Bankrupt
12. Nancy Boyd's Last Sermon
13. Strollers in Tiverton

Tiverton Tales

14. Dooryards
15. A March Wind
16. The Mortuary Chest
17. Horn-o'-the-Moon
18. A Stolen Festival
19. A Last Assembling

73Alice Brown has written 189 short stories to date.

20. The Way of Peace
21. The Experience of Hannah Prime
22. Honey and Myrrh
23. A Second Marriage
24. The Flat-Iron Lot
25. The End of All Living
26. The Miracle
27. Praying Sally
28. The Quest of the Cup

Atlantic Monthly

29. The Pilgrim in Devon
30. Latter-Day Cranford
31. Tribute
32. A Sea Charge
33. The Final Quest
34. His Enemy

Country Neighbors

35. The Play House
36. His First Wife
37. A Flower of April
38. The Auction
39. Saturday Night
40. A Grief Deferred

41. The Challenge
42. Partners
43. Flowers of Paradise
44. Gardener Jim
45. The Silver Tea-set
46. The Other Mrs. Dill
47. The Advocate
48. The Masquerade
49. A Poetess in Spring
50. The Master Minds of History
51. A Day off
52. Old Immortality

The Country Road

53. Bachelor's Fancy
54. A Winter's Courting
55. Rosy Balm
56. A Sea Change
57. The Tree of a Thousand Leaves
58. The Pilgrim Chamber
59. The Twisted Tree
60. The Looking Glass
61. A Hermit in Arcadia
62. A Crown of Gold

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